Subspecies of *Rosa nutkana* and *R. woodsii* (Rosaceae) in Western North America

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Abstract. Three subspecies of *Rosa nutkana* C. Presl and five of *R. woodsii* Lindley are recognized in western Canada and the United States, including four changes in combination and/or status: *Rosa nutkana* subsp. *melina* (Greene) W. H. Lewis & Ertter, *R. woodsii* subsp. *arizonica* (Rydberg) W. H. Lewis & Ertter, *R. woodsii* subsp. *manca* (Greene) W. H. Lewis & Ertter, and *R. woodsii* subsp. *gratissima* (Greene) W. H. Lewis & Ertter. *Rosa nutkana* subsp. *melina* and *R. woodsii* subsp. *manca* occur at high elevations of the southern Rocky Mountains and Colorado Plateau of Colorado and Utah with outlying populations in Arizona, Idaho, New Mexico, and Wyoming; *R. woodsii* subsp. *arizonica* is found at lower elevations of Arizona and the Colorado Plateau; and *R. woodsii* subsp. *gratissima* occurs in the mountains surrounding the Mojave Desert and southern Great Basin of California and Nevada, with its variety *glabrata* (Parish) D. Cole confined to the San Bernardino Mountains of California. Synonyms are provided for appropriate subspecies, 14 lectotypes and one neotype are designated here, and selected exsiccatae are given for newly recognized subspecies. The following names are lectotypified: *Rosa bakeri* Rydberg, nom. illeg., *R. californica* Chamisso & Schlechtendal var. *ultramontana* S. Watson, *R. deserta* Lunell, *R. fendleri* Crépin, *R. macounii* Greene, *R. maximiliani* Nees, *R. megalantha* G. N. Jones, *R. neomexicana* Cockerell, *R. nutkana* var. *alta* Suksdorf, *R. nutkana* var. *hispida* Fernald, *R. nutkana* var. *pallida* Suksdorf, *R. rainierensis* G. N. Jones, *R. spaldingii* Crépin ex Rydberg, and *R. subnuda* Lunell. One neotype is designated: *Rosa woodsii* Lindley.

Key words: *Rosa*, Rosaceae, Western North America.

Rosa nutkana C. Presl and *R. woodsii* Lindley are two of the most widely distributed and variable species of *Rosa* L. in western Canada and the United States. Their diversity is particularly evident at higher elevations throughout the southern Rocky Mountains, including outlying mountainous peaks and ridges, and adjacent basins. In recognition of this diversity, both species have been divided into subspecies characterized by well-defined core morphological features within ecogeographic regions. Plants with intermediate characters may occur occasionally in transitional areas between such zones. Our treatment follows those of Piper (1906) for *R. nutkana* and Taylor and MacBryde (1978) for *R. woodsii*, who recognized *R. nutkana* subsp. *macdougalii* (Holzinger) Piper and *R. woodsii* subsp. *ultramontana* (S. Watson) R. L. Taylor & MacBryde, respectively, as subspecies distinct from their autonyms. Both subspecies occur within the intermontane region between the Rocky Mountains to the east and the Cascade Mountains to the west, with the former primarily restricted to forested areas, while the latter is widespread in riparian sites in the sagebrush zone. In parallel within the high montane ecogeographic region of the southern Rocky Mountains and Colorado Plateau, the two species have also evolved distinct subspecies, which we name *R. nutkana* subsp. *melina* (Greene) W. H. Lewis & Ertter and *R. woodsii* subsp. *manca* (Greene) W. H. Lewis & Ertter, while another *R. woodsii* allied to subspecies *manca*, named subspecies *arizonica* (Rydberg) W. H. Lewis & Ertter, occurs at lower elevations often in montane and plateau riparian habitats of Arizona and adjacent states to the north and east. The subspecies *R. woodsii* subsp. *gratissima* W. H. Lewis & Ertter and its variety *glabrata* (Parish) D. Cole occur to the west in areas in and surrounding the Mojave Desert and southern Great Basin.

Infraspecific taxa in *Rosa* are used by us at three levels: subspecies, variety, and infrequently forma,

although in this treatment only the first two ranks are used, with an emphasis on subspecies. Different subspecies occupy substantial ranges of a species in at least two distinct ecogeographic regions where populations possess distinct morphological characteristics. Such regions are often contiguous, which allows limited gene flow in transitional areas through hybridizing and backcrossing. Physical and other barriers may exist, however, so that differing subspecific populations may be allopatric with consequent isolation and only limited or no gene exchange. Therefore, important features of these subspecific regions are their distinct geography and ecology. For example, with its wide geographic range within the Great Basin, sagebrush (*Artemisia tridentata* Nuttall) also has a broad ecological distribution from dry valley floors to mesic mountaintops, where precipitation is double or triple that of the valley. Three major subspecies (Shultz, 2006) associated with considerable adaptive radiation in both physiological and morphological traits relative to water availability that lead to successful adaptation to drought (Kolb & Sperry, 1999) are found along this gradient. These differences also reflect genetic uniqueness of the subspecies based on common garden experiments. Moreover, ploidy levels differ between subspecies with diploids found at the highest level having moist soils, tetraploids at the lowest level with dry soils, and the intermediate subspecies with mixed diploid/tetraploid populations and an intermediate habitat. Undoubtedly, the evolution of these tetraploids is an example of the adaptive advantage of polyploids able to survive and expand under the harshest of drought conditions (Lewis, 1980). In summary, this is one of the most complete characterizations detailing subspecific successes of a species through physiological, anatomical, and cytogenetic adaptations, while confirming their distinctions based on morphologic, ecologic, and geographic data. This research further illustrates the evolutionary dynamics of populations within well-defined subspecies. Although *R. nutkana* and *R. woodsii* also illustrate clear subspecific distinctions based on morphologic, geographic, and ecologic (habitat) data and concomitant evolutionary lineages, experimental information comparable to that known for *A. tridentata* is not yet available.

Our treatment provides one example of the use of variety to characterize a cluster of populations having a relatively minor, but nevertheless distinctive, morphological variation within typical *Rosa woodsii* subsp. *gratissima* populations. This variant, called variety *glabrata*, having glabrous leaflets (abaxial), rachis/petioles, and stipules, contrasts with the typical variety with puberulent to pubescent leaflets (abaxial) and associated parts. Furthermore, variety *glabrata* is unique to a small geographic area of the subspecies in the San Bernardino Mountains of California. This example illustrates one of several possible instances whereby varietal rank is applicable in *Rosa* taxonomy.

The following synopsis of *Rosa nutkana* and *R. woodsii* consists of keys to subspecies, comprehensive synonymy, and representative exsiccatae of new subspecies and one variety. Fourteen lectotypes and one neotype are designated, including designations for those protologues that used both flowering and fruiting specimens as type, the flowering material collected usually in May or June and the fruiting material in September or October within a given year. Some are mounted separately and other mountings include flowering and fruiting material together; if the latter, they are readily distinguished by flowering and/or early hypanthium development and green leaflets or by fruiting (hips) and yellowish leaflets, while the other gatherings of each cited in the protologue are syntypes. Should lectotype and syntype be mounted on the same sheet, these are noted with pro parte (p.p.) followed by the information for either flower (fl) or fruit (fr). Such syntypes are provided in text following the nomenclature of appropriate subspecies.

1. Rosa nutkana C. Presl, Epim. Bot. 203. 1851. TYPE: Canada. British Columbia: Vancouver Island, Nootka Sound, Aug. 1791, *T. P. X. Haenke s.n.* (holotype, PR, PR photo at MO).

KEY TO THE SUBSPECIES OF *ROSA NUTKANA* IN WESTERN NORTH AMERICA

1a. Shrubs short, 0.4–1.0(–1.5) m tall; fertile branches armed with curved or sometimes straight prickles, or rarely unarmed; sepal outer surfaces mostly stipitate-glandular; higher elevations of southern Rocky Mtns. and adjacent peaks and ridges (2500–3800+ m). . . . . subsp. *melina*

1b. Shrubs taller, 1–3 m tall, occasionally shorter; fertile branches armed with straight or rarely curved prickles, or unarmed; sepal outer surfaces stipitate-glandular or eglandular; common at lower elevations (below 2500 m).

2a. Fertile branches not dense, often with long internodes (to 6.5 cm), commonly unarmed or with infrastipular prickles; leaflets usually eglandular below and singly serrated without gland tips; sepals commonly eglandular; intermontane between the Cascade and Rocky Mtns. . . . . subsp. *macdougalii*

2b. Fertile branches often dense with shorter internodes, armed with paired infrastipular prickles, infrequently unarmed; leaflets often glandular below and commonly bi- or multiserrated and gland tipped; sepals commonly stipitate-glandular; Pacific coast from Alaska to northern California west of the Cascade Mtns. . . . . subsp. *nutkana*

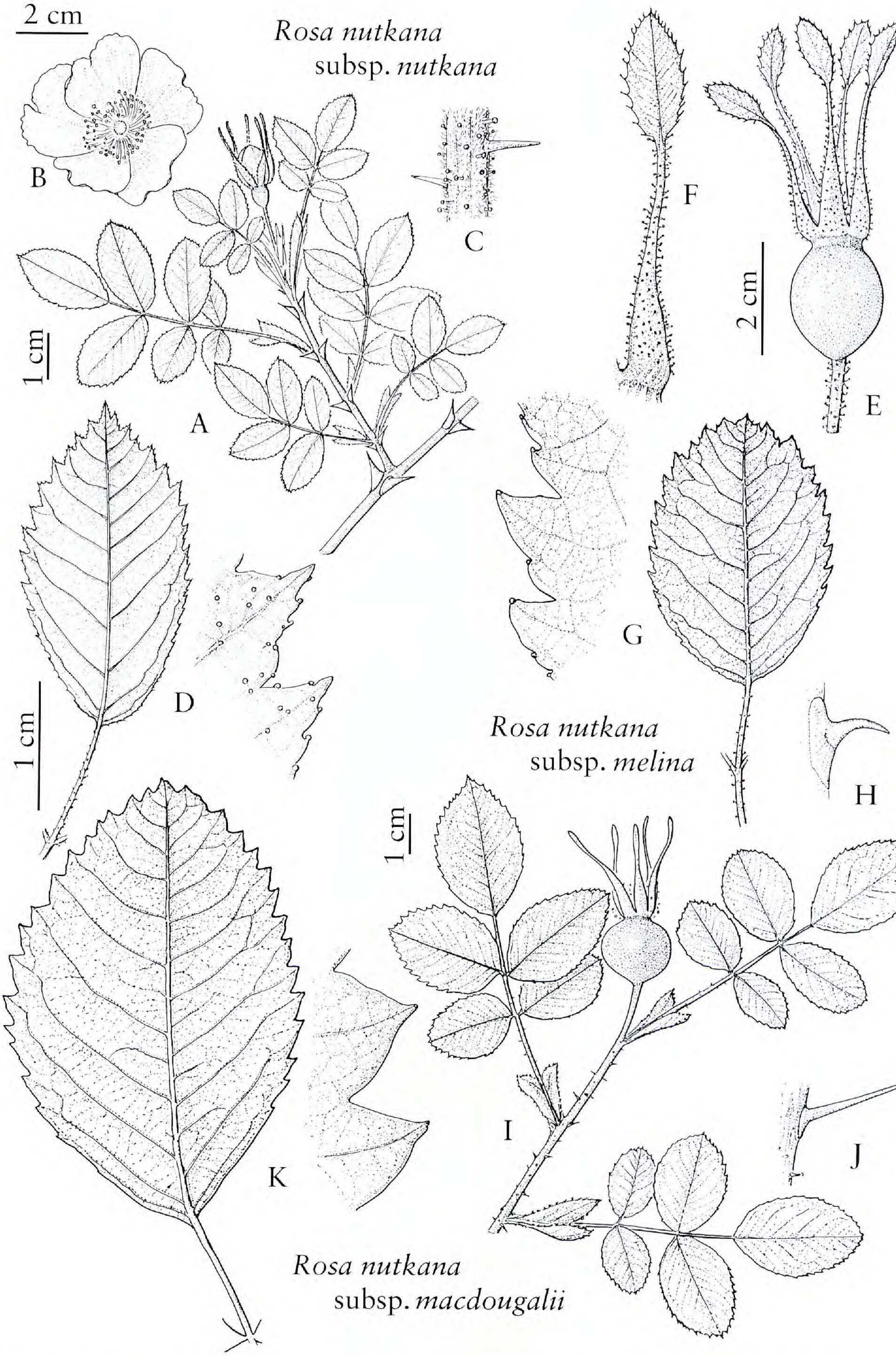

Figure 1. *Rosa nutkana* C. Presl subspecies. A–D. Subspecies *nutkana*. —A. Flowering branch. —B. Flower. —C. Upper branch detail. —D. Terminal leaflet with serrations. E–H. Subspecies *melina* (Greene) W. H. Lewis & Ertter. —E. Hip with sepals. —F. Enlarged sepal. —G. Terminal leaflet with serrations. —H. Curved prickle single or paired. I–K. Subspecies *macdougalii* (Holzinger) Piper. —I. Fruiting branch. —J. Straight prickle. —K. Terminal leaflet with serrations. A–D drawn from *Zeller 781* (MO); E–H drawn from *Heil & Mietty 20197* (SJNM); I–K drawn from *Kirkwood 11180* (MO); all by J. Myers.

1a. Rosa nutkana subsp. **nutkana** C. Presl. Figure 1A–D.

Rosa aleutensis Crépin, Bull. Soc. Roy. Bot. Belgique 15: 48. 1876. TYPE: U.S.A. Alaska: Aleutians West Co., Unalaska Island (as "Ile d'Unalaschka"), 1846, *P. K. N. S. Turczaninow s.n.* (holotype, BR; isotype, LE not seen).

Rosa caryocarpa Douglas ex Crépin, Bull. Soc. Roy. Bot. Belgique 15: 39. 1876, nom. inval., pro syn. sub *R. nutkana* C. Presl.

Rosa durandii Crépin, Bull. Soc. Bot. France 22: 19. 1875. TYPE: U.S.A. Oregon: s. loc., 1871, *E. Hall 146* (holotype, P-Durand herbarium; isotypes, BR [fragment], F 455214, GH 32569, K, MO 1951280, NY 743773).

Rosa lyalliana Crépin, Bull. Soc. Roy. Bot. Belgique 16: 39. 1876, nom. inval., pro syn. sub *R. nutkana* C. Presl.

Rosa muriculata Greene, Leafl. Bot. Obs. Crit. 2: 263. 1912. *Rosa nutkana* var. *muriculata* (Greene) G. N. Jones, Madroño 3: 128. 1935. TYPE: U.S.A. Washington: Cowlitz Co., near Woodland, 15 July 1898, *F. V. Coville 705* (holotype, US 80003; isotype, NY 335710 [fragment]).

Rosa nutkana var. *setosa* G. N. Jones, Madroño 3: 129. 1935. Syn. nov. TYPE: U.S.A. Washington: Island Co., Rocky point near Deception Pass, Whidbey Island, 2 June 1934, *G. N. Jones 4908* (holotype, WTU 15784).

Rosa caryocarpa was collected by David Douglas in 1825 along the banks of the Columbia River in either Oregon or Washington, U.S.A. Sheets bearing his writing are at BM and K (Herb. Bentham 1854). The name otherwise appears only in Crépin's (1876: 39) synonymy of *R. nutkana*.

As part of the Oregon Boundary Commission activities along the United States and Canada border from Montana to British Columbia, David Lyall collected material from Vancouver Island and the Lower Fraser River, British Columbia, which Crépin named *Rosa lyalliana* in his honor on sheets at BR and BM. The name was provided by Crépin (1876: 39) as a synonym of *R. nutkana*. This naming also highlighted the joint American/British survey of the Northwest from Montana to British Columbia during 1857–1861 when many plants and animals were collected (Lyall, 1863). Most, if not all, collections and documents made by Lyall and other British survey members were returned to London where they were widely dispersed (to GH in North America), while documentations and collections obtained by the American Commission over this entire period were essentially lost.

The West Coast *Rosa nutkana* subsp. *nutkana* ranges from coastal Alaska south to northern California generally west of the Cascade Mountains.

1b. Rosa nutkana C. Presl subsp. **macdougalii** (Holzinger) Piper, Contr. U.S. Natl. Herb. 11: 335. 1906. *Rosa macdougalii* Holzinger, Contr. U.S. Natl. Herb. 3: 223. 1895. TYPE: U.S.A. Idaho: Kootenai Co., canyons near Farmington Landing, S end of Lake Coeur d'Alene, 7 July 1892, *J. H. Sandberg, D. T. MacDougal & A. A. Heller 572* (holotype, US 239980; isotypes, A, BR, DS 106275, F 124416, MO 775326, NA, NY 335711 & 415851, PH). Figure 1I–K.

Rosa anatonensis H. St. John, Fl. Southeast Wash. & Idaho 206. 1937 (as "anatonesis"). TYPE: U.S.A. Washington: Asotin Co., SW of Anatone, 850 m, 30 May 1928, *H. St. John & R. Palmer 9555* (holotype, WS 67719; isotypes, GH 32553, NY 415907, UC 544889, US 1654731, WS 67864 & 67865, WTU 31915).

Rosa brownii Rydberg, Bull. Torrey Bot. Club 44: 70. 1917. TYPE: U.S.A. California: Siskiyou Co., N side of Mt. Shasta, 1524–2743 m, 11–16 June 1897, *H. E. Brown 349* (holotype, NY 345434; isotypes, MO 1951258, NY 345435, US 299325).

Rosa caeruleimontana H. St. John, Fl. Southeast Wash. & Idaho 207. 1937. TYPE: U.S.A. Washington: Asotin Co., Blue Mtns., 15 June 1928, *G. N. Jones 1892* (holotype, WS 67855; isotypes, BM, CAS, ILL not seen, SIU not seen, UC 544888, WS 67856 & 67857).

Rosa columbiana Rydberg, N. Amer. Fl. 22: 514. 1918. Syn. nov. TYPE: U.S.A. Idaho: Latah Co., valley of Little Potlatch River, 13 June 1892, *J. H. Sandberg, D. T. MacDougal & A. A. Heller 381* (holotype, NY 415921; isotype, MO 775380).

Rosa delitescens Greene, Leafl. Bot. Observ. Crit. 2: 265. 1912. Syn. nov. TYPE: U.S.A. Oregon: Jackson Co., Siskiyou Mtns., 3 Sep. 1889, *E. L. Greene s.n.* (holotype, NDG 23506).

Rosa jonesii H. St. John, Fl. Southeast Wash. & Idaho 207. 1937. TYPE: U.S.A. Washington: Latah Co., summit of Moscow Mtn., 26 June 1928, *H. St. John & G. N. Jones 9621* (holotype, WS 67852; isotypes, F 821225, GH 32582, MIN 332732, P, RM 143117, UC 544890, US 1654699, WS 67851 & 67853, WTU 31922).

Rosa macrocarpa Nuttall ex Rafinesque, Med. Bot. 2: 258. 1830, nom. illeg., non F. V. Mérat, Nouv. Fl. Env. Paris 190. 1812. Syn. nov. U.S.A. Oregon or Washington: Columbia River, s.d., *Nuttall s.n.* (holotype, GH).

Rosa megacarpa Nuttall ex Torrey & A. Gray, Fl. N. Amer. 1: 460. 1840, nom. inval., pro syn. sub *R. fraxinifolia* Borkhausen.

Rosa megalantha G. N. Jones, Proc. Biol. Soc. Wash. 41: 194. 1928. *Rosa spaldingii* var. *alta* G. N. Jones, Madroño 3: 132. 1935. Syn. nov. TYPE: U.S.A. Washington: Spokane Co., Spokane, Lincoln Park, 600 m, 17 June (fl) & 10 Oct. 1927 (fr), *G. N. Jones 614* (lectotype, designated here, 17 June 1927 [fl], WS 44430; isotypes, NY 743772, US 1924116, WS 43531, WTU 22024).

Rosa nutkana var. *alta* Suksdorf, Werdenda 1: 23. 1927. Syn. nov. TYPE: U.S.A. Washington: Klickitat Co., Bingen, 25 May & 27 Oct. 1922, *W. Suksdorf 10821* (lectotype, designated here, 27 Oct. 1922 [fr], MO 952023; isotypes, BM, GH 32597, K p.p. [fr], MIN 584249 p.p. [fr], NY 415857 p.p. [fr], PH 654914 p.p. [fr], UC 351907 p.p. [fr], WS 121329 sheet 2, WTU 196772 p.p. [fr]).

Rosa nutkana var. *hispida* Fernald, Bot. Gaz. 19: 335. 1894. *Rosa spaldingii* var. *hispida* (Fernald) G. N. Jones,

Madroño 3: 130. 1935. Syn. nov. TYPE: U.S.A. Montana: Rock Creek, 17 July 1880, *S. Watson 124* (lectotype, designated here, GH 32593).

Rosa nutkana var. *pallida* Suksdorf, Werdenda 1: 23. 1927. Syn. nov. TYPE: U.S.A. Washington: Klickitat Co., Falcon Valley, 21 June & 14 Oct. 1919, *W. Suksdorf 10244* (lectotype, designated here, 21 June 1919 [fl], MO 952924; isotypes, BM, GH 32585 p.p. [fl], K p.p. [fl], NY 415858 p.p. [fl], PH 654932 p.p. [fl], UC 351877, US 1438016, WS 121268 p.p. [fl], WTU 196828 & 196771 p.p. [fl]).

Rosa rainierensis G. N. Jones, Univ. Wash. Publ. Biol. 7: 103, 174. 1938. TYPE: U.S.A. Washington: Lewis Co., Mt. Rainier, Goat Mtn., 1370 m, 11 July & 19 Oct. 1897, *O. D. Allen 292* (lectotype, designated here, 11 July 1897 [fl], WS 13052 p.p. [fl]; isotypes, MO 1951279 p.p. [fl], NY 415878 p.p. [fl], WTU 38311 p.p. [fl]).

Rosa spaldingii Crépin ex Rydberg, Flora Rocky Mts. 442. 1917. TYPE: U.S.A. Idaho (as Oregon): Clear Water (as Lapwai), *Rev. Spalding s.n.* (lectotype, designated here, BR; isotypes, BM, GH, K, P, PH).

Rosa spaldingii var. *chelanensis* G. N. Jones, Madroño 3: 133. 1935. Syn. nov. TYPE: U.S.A. Washington: Chelan Co., along Wenatchee River, near Cashmere, 23 Aug. 1927, *G. N. Jones 1402* (holotype, WTU 356692; isotype, WTU 356693 not seen).

Rosa spaldingii var. *parkeri* H. St. John, Fl. Southeast Wash. & Idaho 210. 1937. Syn. nov. TYPE: U.S.A. Idaho: Latah Co., Grizzly Camp, 2 July 1922, *C. S. Parker 503* (holotype, WS 47857; isotype, F).

Besides being illegitimate, publication of *Rosa macrocarpa* is certainly doubtful, for Rafinesque's description is limited to fruit the "size of pigeon egg, very good," and no subsequent description is known.

Rosa megacarpa was named by Nuttall for material he collected in Oregon (now Oregon or Washington) in open woods. Torrey and Gray (1840: 460) placed it in synonymy of *R. fraxinifolia* Borkhausen and mistakenly considered the collection to be of coastal origin. Nuttall's material at K is clearly *R. nutkana* from east of the Cascade Mountains (= subsp. *macdougalii*). It is most unfortunate that Torrey and Gray decided not to publish Nuttall's new species and description, for *R. megacarpa* would have predated C. Presl's *R. nutkana* by 11 years.

In his protologue, Jones provided two collections (both *Jones 614*) of *Rosa megalantha*: the flowering collection (17 June 1927) is designated lectotype in part because Jones noted in his protologue "conspicuous for its numerous, large, fragrant flowers," while the fruiting material was not mentioned. Further, numerous isolectotypes of flowering material have been distributed, while only two collections of fruiting material are known at one institution (syntype 10 Oct. 1927 [fr] at WS 43530 and 43532).

Of Suksdorf's (*10821*) two collections of *R. nutkana* var. *alta*, fruiting material (12 Oct. 1922) is somewhat more widely distributed than flowering (25 May 1922); as both sets are diagnostically equivalent, the former is selected lectotype with its more numerous isolectotypes. Syntypes of 25 May (fl) are at GH 32596, K p.p. (fl), MIN 584249 p.p. (fl), NY 415857 p.p. (fl), PH 654914 p.p. (fl), WS 121329 sheets 3 and 4, and WTU 196772 p.p. (fl).

Suksdorf 10244 is the basis of *Rosa nutkana* var. *pallida*; there is no particular reason for selecting the flowering collection (21 June 1919) lectotype except that it is available at MO, and only flowering material is mounted on this sheet. Syntypes of 14 Oct. 1919 (fr) are at GH 32585 p.p. (fr), K p.p. (fr), NY 415858 p.p. (fr), GH 654932 p.p. (fr), UC 351907 p.p. (fl), WS 121268 p.p. (fr), and WTU 196828 & 196771 p.p. (fr).

Fernald cited three syntypes of *Rosa nutkana* var. *hispida* in his protologue, of which the earliest collection made by S. Watson and deposited in his and Fernald's institutional herbarium (GH) is selected lectotype, while *C. V. Piper 1540* (Washington: Whitman Co., Pullman) represented by collections of 25 June 1893 (GH 32591) and September 1893 (not seen) are syntypes.

Flowering material of *Rosa rainierensis* at Jones's institutional herbarium is diagnostic and selected lectotype with numerous isolectotypes. Syntypes of 19 Oct. 1897 (fr) are at MO 1951279 p.p. (fr), NY 415878 p.p. (fr), WS 13052 p.p. (fr), and WTU 38311 p.p. (fr).

The selected lectotype of *Rosa spaldingii* at BR bears Crépin's annotation and is not complicated by having flowering and fruiting material mounted together as, for example, the isolectotype at BM.

The intermontane *Rosa nutkana* subsp. *macdougalii* occurs from central British Columbia east of the Cascade Mountains in Canada to northern California, east to Montana and Wyoming, and south to Colorado and Utah in the United States.

1c. Rosa nutkana C. Presl subsp. **melina** (Greene) W. H. Lewis & Ertter, comb. et stat. nov. Basionym: *Rosa melina* Greene, Pittonia 4: 10. 1899. TYPE: U.S.A. Colorado: Montrose Co., Cerro Summit, near Cimarron, 30 Aug. 1896, *E. L. Greene s.n.* (holotype, NDG 23707). Figure 1E–H.

Rosa oreophila Rydberg, Bull. Torrey Bot. Club 31: 561. 1904. Syn. nov. TYPE: U.S.A. Colorado: Routt Co., Four-miles Hill, 2590 m, 22 July 1896, *C. F. Baker s.n.* (holotype, NY 415860; isotypes, MO 1951203, NDG 23560, NY 415862).

Rosa pandorana Greene ex Rydberg, Fl. Colorado 190–191. 1906. Syn. nov. TYPE: U.S.A. Colorado: San Miguel Co., region of Gunnison Watershed, Pandora, 10 Aug. 1901, *C. F. Baker 751* (holotype, US 412379; isotypes, GH 32605, K, MIN 131154, MO 123831, NY 415866, RM [2 sheets]).

Rosa underwoodii Rydberg, Bull. Torrey Bot. Club 31: 560. 1904. Syn. nov. TYPE: U.S.A. Colorado: Ouray Co., W

of Ouray, above Box Cañon, 2300–2700 m, 8 Sep. 1904, *L. M. Underwood & A. D. Selby 122* (holotype, NY 429915).

When at US, E. L. Greene named the *C. F. Baker 751* sheet "*Rosa pandorana* Greene n. sp.," which was later published by P. A. Rydberg in the *Flora of Colorado*. This sheet is holotype with isotypes recorded at six herbaria. Later, Rydberg (1918: 513) reduced *R. pandorana* to synonymy of *R. melina* Greene (= *R. nutkana* subsp. *melina*).

On sheets at NDG, Greene also annotated certain collections identifiable as *Rosa nutkana* subsp. *melina* using the names *Rosa pudica* (U.S.A. Colorado: Chaffee Co., Marshall Pass, 3310 m, 20 Aug. 1902, *C. F. Baker 872*) or *Rosa stygia* (U.S.A. Colorado: Gunnison Co., Black Cañon, 27 June 1901, *C. F. Baker 263*). These and other Baker collection sets are widely distributed.

Rosa nutkana subsp. *melina* is endemic to high mountains of Colorado, New Mexico, and Utah and rare in southeastern Idaho, Montana, and Wyoming, often on isolated peaks and ridges in or at edges of aspen, fir, spruce, and/or pine forests at elevations of 2500–3800+ m. This distribution, to some degree, includes the subspecies in the Southern Rocky Mountain Floristic Element (McLaughlin, 1989), paralleling that of *R. woodsii* subsp. *manca* except for the Mogollon Rim component. In some regions, as in central and western Colorado and southeastern Utah, *R. nutkana* subsp. *melina* is frequent and may be found growing near or with *R. woodsii* subsp. *manca*, but the subspecies also occurs at higher elevations beyond the others' range. Hybrids are possible but not expected even in mixed or nearby populations; this is because *R. nutkana* subsp. *melina* is hexaploid, while *R. woodsii* subsp. *manca* is diploid and because flowering of *R. nutkana* subsp. *melina* occurs before that of *R. woodsii* subsp. *manca*, although there can be an overlap of anthesis. No intermediate tetraploid hybrid has been found (Bruneau, Ertter & Lewis, unpublished data).

Selected exsiccatae. U.S.A. **Colorado:** Archuleta Co., S San Juan Wilderness Area, N side Fish Lake trail, 2870 m, 19 July 2003, *L. Lundquist & G. Rink L216a* (MO, SJNM); Garfield Co., to Little Trappers' Lake, 2870 m, 3 Aug. 1933, *L. A. Hanna 1512* (MO); Gunnison Co., Alpine rd. at milepost 15.7, 11.1 mi. S of U.S. hwy. 50, ca. 3080 m, 11 July 2006, *J. L. Reveal 8777* (with *C. R. Broome*) (MARY, MO, NY); vic. of Mt. Carbon, 3000 m, 29 June 1910, *W. W. Eggleston 5779* (US); La Plata Co., La Plata Canyon, beyond old La Plata City, 2875 m, 20 July 2005, *W. H. Lewis & M. Elvin-Lewis 21000* (MO, MT, UC); Mesa Co., 5 mi. NW of Mesa Lake, ca. 2440 m, 17 Aug. 1955, *F. J. Hermann 12184* (US); Mineral Co., FS rd. 634, 1.3 mi. E of jct. with FS rd. 633, 2575 m, 21 Aug. 2002, *K. Heil & W. Mietty 20197* (SJNM); Montezuma Co., Mancos Canyon, 2 mi. above Aspen Guard station, 20 July 2005, 2985 m, *W. H. Lewis & M. Elvin-Lewis 15992* (MO, MT, UC); Montrose Co., Uncomprahgre Plateau, head of Red Canyon, 2865 m, 7 Aug. 2004, *B. Ertter 18464 et al.* (MO, UC); Rio Grande Co., FS rd. 667, ca. 7 mi. SW of McCormick cabin, 3170 m, 24 July 1996, *K. Heil 10397* (SJNM); San Miguel Co., near Trout Lake, 3000 m, 16 Aug. 1924, *E. B. Payson & L. B. Payson 4141* (GH, MO, UC). **Idaho:** Cassia Co., Hereford Ranger Station, 2440 m, 7 June 1927, *W. P. Cottam 3022* (F). **New Mexico:** Taos Co., Carson Forest, Apache Peak & Spring, 3000 m, 23 Aug. 1923, *W. W. Eggleston 19251* (US). **Utah:** Grand Co., Uinta Basin, 10 mi. E of Sunnyside near Willow Springs, 2910 m, 11 July 1935, *E. H. Graham 9580* (A, MO); San Juan Co., Abajo Mtns., N slope, 2590–3355 m, 1–2 July 1930, *G. J. Goodman & C. L. Hitchcock 1424* (MO).

2. Rosa woodsii Lindley, Ros. Monogr. 21. 1820. TYPE: U.S.A. (Nebraska–Iowa to Montana, not Missouri): near Missouri River, seeds grown by J. Sabine, Royal Hort. Society; "cultiv. HHS 1825" on herb. collection of plant designated "type" five years following publication of species (neotype, designated here, CGE).

Key to the Subspecies of *Rosa woodsii* in Central and Western North America

1a. Shrubs most frequently short, typically less than 1 m, infrequently to 2 m; fertile branches densely prickly of various sizes, rarely few or unarmed; terminal leaflets obovate, fewer ovate or elliptic; flowers 1 to 3, rarely more; prairies and plains of central North America extending into the Rocky Mtns. and nearby Southwest.
  2a. Prickles straight, rarely curved; sepals commonly eglandular on outer surfaces or margins; rare or absent in highest elevations of Rocky Mtns. and outlying peaks and ridges . . . . . subsp. *woodsii*
  2b. Prickles curved, rarely straight; sepals commonly stipitate-glandular on outer surfaces or margins; endemic to high elevations of Rocky Mtns. and outlying peaks and ridges . . . . . subsp. *manca*
1b. Shrubs most frequently tall, 1–3(–5) m; flowering branches unarmed or with straight or curved prickles; terminal leaflets ovate to elliptic, fewer obovate; flowers 1 or 2 or corymbose and then 3 to 10(to 15); western North America including the far Southwest.
  3a. Prickles typically strongly curved, mostly short and stout, infrastipular paired; flowers 1 or 2 most common (to 6); sepals stipitate-glandular on outer surfaces or margins, infrequently eglandular; low mountains and elevated riparian areas, primarily in northern Arizona and adjacent New Mexico, Colorado, Utah, and Nevada, with possible disjuncts as far north as southern Idaho . . . . subsp. *arizonica*
  3b. Prickles straight or occasionally somewhat curved, absent or few to dense; flowers few, 3 most common or numerous (to 15); sepals eglandular or infrequently stipitate-glandular; intermontane between Cascade and Rocky Mtns. of British Columbia to southern Great

Basin and mountains of Mojave Desert, and east to Rocky Mtns.

4a. Stems openly branching; prickles absent or sometimes scattered and/or infrastipular singly or paired, predominately straight; flowers commonly corymbose, 3 to 10(to 15); intermontane between Cascade and Rocky Mtns., common in Great Basin . . . . . subsp. *ultramontana*

4b. Stems densely branching; prickles stout and often long, straight or curved, sometimes infrastipular and often dense and varying in size internodally; SW Great Basin, Mojave Desert and adjacent mountains . . . . . .subsp. *gratissima*

2a. Rosa woodsii Lindley subsp. **woodsii**. Figure 2A–D.

Rosa demareei E. J. Palmer, J. Arnold Arbor. 10: 36. 1929. Syn. nov. TYPE: U.S.A. Texas: Jeff Davis Co., Davis Mtns., Mt. Livermore, 4 June 1928, *E. J. Palmer* (with *D. Demaree*) *34351* (holotype, A 32568; isotypes, BH, F 678153, PH 690968, US 1439498).

Rosa deserta Lunell, Amer. Midl. Naturalist 2: 156. 1912. TYPE: U.S.A. North Dakota: Benson Co., Pleasant Lake, 2 July (fl) & 14 Aug. (fr) 1911, *J. Lunell 592* (lectotype, designated here, 14 Aug. 1911 [fr], MIN 245877; isotypes, MO 1011606 [fr], NY 415925 [fr] & 415926 [fr], PH 697763 [fr]).

Rosa fendleri Crépin, Bull. Soc. Roy. Bot. Belgique 15: 91. 1876. *Rosa woodsii* var. *fendleri* (Crépin) Rydberg in Bessey, Fl. Nebr., Rosales 21: 22. 1895. TYPE: U.S.A. New Mexico: vic. of Las Vegas, Aug. 1847, *A. Fendler 210* (lectotype, designated here, BR; isotypes, BM, CGE, GH 32572 & 32574, K, MO 1949548, P, UC 711153).

Rosa fimbriatula Greene, Leafl. Bot. Observ. Crit. 2: 135. 1912. TYPE: U.S.A. Montana: rt. bank of Missouri River, 15 mi. below Round Butte, 1 Sep. 188x, *L. F. Ward s.n.* (holotype, US 46847; isotype, US 46848).

Rosa foliolosa [var.] *leiocarpa* Torrey in Frémont, Rep. 89. 1843. TYPE: U.S.A. Nebraska: Lower Platte River, *J. C. Frémont s.n.* (holotype, NY 415838).

Rosa hypoleuca Wooton & Standley, Contr. U.S. Natl. Herb. 16: 131. 1913. TYPE: U.S.A. New Mexico: Sierra Co., S end of Black Range, near Kingston, 1 June 1904, 1980 m, *O. B. Metcalfe 940* (holotype, US 497843; isotype, NY 415845).

Rosa macounii Greene, Pittonia 4: 10. 1899. TYPE: Canada. Saskatchewan (as "Assiniboia"): Milk River, 7 July 1895, *J. Macoun s.n.*, GSC 10533 (lectotype, designated here, CAN 100023; isotypes, GH 32585, NDG 23690).

Rosa maximiliani Nees in Wied-Neuwied, Reise N. Amer. 2: 434. 1841. TYPE: U.S.A. South Dakota to NE Montana: vic. of Missouri River, *A. P. Maximilian s.n.* (lectotype, designated here, BR [Carl von Martius herb. 1444]).

Rosa naiadum Lunell, Amer. Midl. Naturalist 3: 139. 1913. TYPE: U.S.A. North Dakota: Ward Co., Minot, along Souris River, 1 July 1909, *J. Lunell 596* (holotype, MIN 245872).

Rosa poetica Lunell, Amer. Midl. Naturalist. 3: 138. 1913. TYPE: U.S.A. North Dakota: Burleigh Co., banks of Missouri River, near Bismarck, 23 Aug. 1913, *J. Lunell 593* (holotype, MIN 245883).

Rosa sandbergii Greene, Leafl. Bot. Observ. Crit. 2: 137. 1911. TYPE: U.S.A. Montana: Dawson Co., Colgate, near Glendive, 6 Sep. 1892, *J. H. Sandberg, D. T. Macdougal & A. A. Heller 1009* (holotype, US 239926; isotype, NY 415882).

Rosa standleyi Rydberg, N. Amer. Fl. 22: 527. 1918. TYPE: U.S.A. New Mexico: San Miguel Co., near Pecos, 18 Aug. 1908, 2045 m, *P. C. Standley 5043* (holotype, NY 4298991; isotypes, GH 32620, MO 123830).

Rosa subnuda Lunell, Amer. Midl. Naturalist 2: 153. 1912. TYPE: U.S.A. North Dakota: Benson Co., Butte, 25 June (fl) & 28 Aug. 1911 [fr], *J. Lunell 596* (lectotype, designated here, 25 June 1911 [fl], MIN 245873; isotypes, MIN 245874 [fl], RM 156259 [fl]).

Rosa terrens Lunell, Amer. Midl. Naturalist 2: 151. 1912. *Rosa woodsii* var. *terrens* (Lunell) Breitung, Canad. Field-Naturalist 68: 82. 1954. Syn. nov. TYPE: U.S.A. North Dakota: Benson Co., Pleasant Lake, 14 Aug. 1911, *J. Lunell 594* (holotype, MIN 245875 [sheet 1 of 2]; isotype, MIN 245875 [sheet 2 of 2]).

Fruiting material (14 Aug. 1911) of *Rosa deserta* is designated lectotype as it is diagnostic and isolectotypes are widely available; syntype (2 July 1911 [fl]) is at MIN 245858.

In his protologue, Crépin described *Rosa fendleri* based on a collection at B, which was destroyed during World War II. Later in the protologue, he discussed finding *Fendler 210* at both BM and K, the former described with some uncertainty due to variation from the Berlin material, while the K collection was not discussed further, presumably because it was more similar to the original B collection. It is diagnostic, and so the K specimen is chosen lectotype.

Rosa foliolosa [var.] *leiocarpa* (smooth hip) is not an eglandular hipped form of *R. foliolosa* Nuttall, which is not known from or near Nebraska. Rather, Torrey mistakenly described a new variety of *R. woodsii* that is typical of the species. In their protologue three years earlier, Torrey and Gray (1840: 460) extended the range of *R. foliolosa*, with a query, to eastern Florida, which is *R. palustris* Marshall. Clearly Nuttall, but not Torrey or Gray, had a correct concept of his new species, which is known only from south-central U.S.A.

In his protologue, Greene cited three syntypes of *Rosa macounii*, two collected in Assiniboia (Saskatchewan) and a third in Wyoming. Based on Rydberg's (1918: 525) selection of the type locality as Saskatchewan, and since these two were collected by Macoun and are diagnostic, the Milk River collection is selected lectotype where isolectotypes are known at both GH and NDG. Syntypes are from: CANADA. Saskatchewan: Moose Jaw, 13 Aug. 1895, *J. Macoun s.n.*, GSC 10532 (CAN 100025); and U.S.A. Wyoming: Laramie Co., near Cheyenne, 24 June 1896, *E. L. Greene s.n.* (NDG 23692). Martin and Hutchins (1980: 928) reduced *R. macounii* to a variety of *R. woodsii*, but as the basionym was not provided it

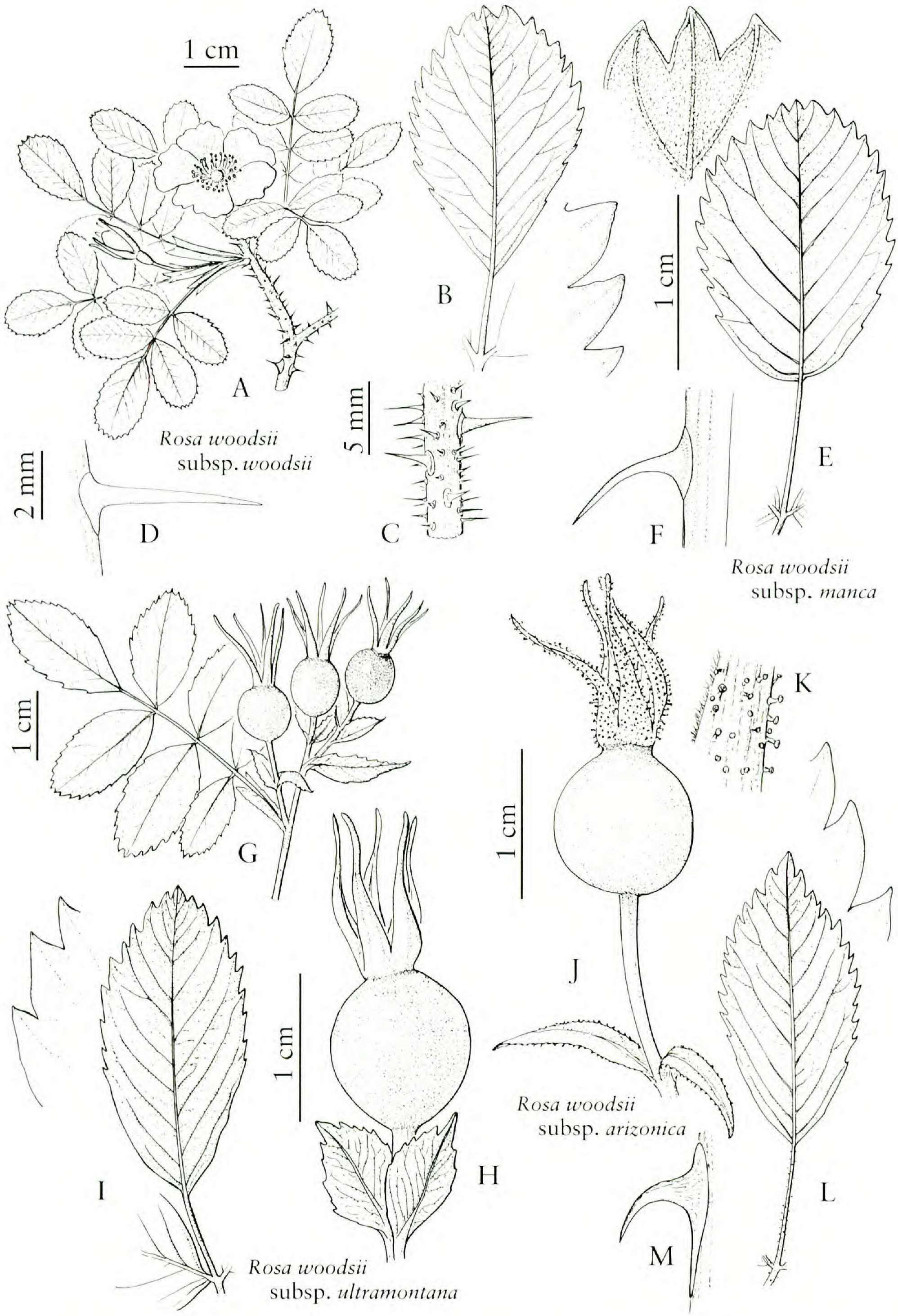

Figure 2. *Rosa woodsii* Lindley subspecies. A–D. Subspecies *woodsii*. —A. Flowering branch. —B. Terminal leaflet with serrations. —C. Varying prickles of branch. —D. Straight prickle. E–F. Subspecies *manca* (Greene) W. H. Lewis & Ertter. —E. Terminal leaflet with serrations. —F. Curved prickle single or paired. G–I. Subspecies *ultramontana* (S. Watson) R. L. Taylor & MacBryde. —G. Fruiting branch. —H. Hip with sepals and bracts. —I. Terminal leaflet with serrations. J–M. Subspecies *arizonica* (Rydberg) W. H. Lewis & Ertter —J. Hip with sepals. —K. Enlarged sepal section showing stipitate glands. —L. Leaflet with serrations. —M. Hooked short prickle single or double. A–D drawn from *Croutch 4* (MO); E–F drawn from *Heil & Mietty 19938* (SJNM); G–I drawn from *Garrett 4099* (MO); J–M drawn from *Ertter 18487* (MO); all by J. Myers.

remains an invalid name. Similarly, another variety of theirs, *R. woodsia* var. *hypoleuca* (Wooten & Standley) W. C. Martin & C. R. Hutchins (1980: 928), is also invalid because it lacks a cited basionym.

As both the Maximilian and Martius herbaria are well represented in Crépin's herbarium at BR, the specimen there identified as *Rosa maximiliani* is chosen lectotype, as no other original collection has been located.

Rosa subnuda flowering material, *Lunell 594* (25 June 1911 [fl]), is selected lectotype because the syntype (14 Aug. 1911 [fr]) has not been found.

Rosa woodsii subsp. *woodsii* occurs in the prairies and high plains, often in woodland or riparian habitats, of central Canada and the United States from east-central Alaska, southern Yukon, and the Northwest Territory, south to northeastern British Columbia, and east to Manitoba; it is rare to western Ontario and Wisconsin, south to western Iowa, northwestern Oklahoma, western Texas, and west to New Mexico and eastern Arizona, and also extends into the passes of the Rocky Mountains from Montana to Colorado.

2b. Rosa woodsii Lindley subsp. **ultramontana** (S. Watson) R. L. Taylor & MacBryde, Canad. J. Bot. 56: 189. 1978. Basionym: *Rosa californica* Chamisso & Schlechtendal var. *ultramontana* S. Watson in W. H. Brewer & S. Watson, Fl. Calif. 1: 187. 1876. *Rosa ultramontana* (S. Watson) A. Heller, Muhlenbergia 1: 107. 1904. *Rosa woodsii* var. *ultramontana* (S. Watson) Jepson, Fl. Calif. 2: 210. 1936. *Rosa pisocarpa* var. *ultramontana* (S. Watson) M. Peck (as "*transmontana*"), Man. Higher Pl. Oregon 404. 1941. TYPE: U.S.A. Nevada: Elko Co., East Humboldt Mtns. (= Ruby Mtns.), 2134 m (7000 ft.), July 1868, *S. Watson 349* (lectotype, designated here, GH 244258). Figure 2G–I.

Rosa chrysocarpa Rydberg, Bull. Torrey Bot. Club 44: 74. 1917. TYPE: U.S.A. Utah: San Juan Co., Allen Cañon, SW of Abajo Mtn., 1800–2000 m, 30–31 July 1911, *P. A. Rydberg & A. O. Garrett 9302* (holotype, NY 415920; isotype, US 765208).

Rosa grosseserrata E. E. Nelson, Bot. Gaz. 30: 119. 1900 (as "*grosse-serrata*"). TYPE: U.S.A. Wyoming: Madison River, Yellowstone Park, 30 Aug. 1899, *A. Nelson & E. W. Nelson 6787* (holotype, RM 20282; isotypes, MO 1798950, NY 415843, P, RM 156216).

Rosa lapwaiensis H. St. John, Fl. Southeast Wash. & Idaho, 208. 1937. TYPE: U.S.A. Idaho: Nez Perce Co., Spalding, flat by Lapwai Creek, 27 May 1928, *H. St. John, W. W. Eggleston, C. English & G. N. Jones 9538* (holotype, WS 64725; isotypes, GH 32584, MIN 332733, NY 415848, RM 143193, UC 544891, US 1654700, WS 64381 & 64382).

Rosa pyrifera Rydberg, Fl. Rocky Mts. 445, 1062. 1917. TYPE: U.S.A. Idaho: Bonner Co., shores of Lake Pend d'Oreille, near Lake View, 7 Aug. 1892, *J. H. Sandberg, D. T. MacDougal & A. A. Heller 871* (holotype, NY 415877; isotypes, K, MIN 258201, US 239145).

Rosa rotundata Rydberg, Bull. Torrey Bot. Club 44: 76. 1917. Syn. nov. TYPE: U.S.A. Nevada: Washoe Co., mtns. W of Franktown, 1737 m, 2 July 1912, *A. A. Heller 10520* (holotype, NY 335708; isotypes, DS 12495, GH 32615 & 61910, US 509790).

Rosa salictorum Rydberg, Bull. Torrey Bot. Club 44: 77. 1917. TYPE: U.S.A. Nevada: Nevada Co., Gold Creek, 1920 m, 25 July 1912, *A. Nelson & J. F. Macbride 2113* [often only *J. F. Macbride*] (holotype, NY 415880; isotypes, DS 252551, GH 32617, MO 1035641, NY 415881, POM 190661, RM 76160 & 132364, UC 500427).

The original description of *Rosa californica* var. *ultramontana* did not cite collections and noted only that the variety is "on the eastern side of the Sierra Nevada, ranging to the Rocky Mountains." The inclusion of "*R. blanda*, Watson, Bot. King Exp. 91, and others" in his protologue, however, is an indirect reference to King Expedition 349, which is the number cited for *R. blanda* in the botanical report of the U.S. Geological Exploration of the Fortieth Parallel (Watson, 1871). As noted by Tiehm (1985), expedition numbers in this report were assigned to all collections believed to be the same taxon, often from multiple localities, and were primarily distributed among GH, NY, US, and YU. Although Tiehm recommends that taxa described by Watson be lectotypified on specimens at US, since this is where Watson was based while preparing the King Expedition report, the GH specimen of *Watson 349* collected by Watson in East Humboldt Mountains is selected as lectotype, because Watson was at Harvard University while preparing the *Botany of California*. The designated lectotype is an excellent representative specimen, with both flowers and developing fruit, and is annotated as *R. californica* var. *ultramontana* in Watson's hand. Syntypes of *Watson 349* include Unionville [Valley] (Pershing Co., NV), June 1868, *S. Watson* (NY 415919, US 65169, YU not seen), Humboldt Mountains (Elko Co., NV), Sept. 1868, *S. Watson* (NY 415918), and Truckee Valley (Washoe Co., NV), July 1867, *W. W. Bailey* (GH 244259, US 65170). The Bailey collection at GH is mounted on the same sheet with the lectotype, along with a collection by C. L. Anderson from Carson City, Nevada Territory, 1863 (GH 244263). The Anderson collection, and possibly numerous others, also qualifies as a syntype, given Watson's blanket reference to "and others" in his protologue.

Rosa woodsii subsp. *ultramontana* occurs from central British Columbia east to Idaho, western Wyoming, and probably also western Montana, south to California east of the Cascade Mountains, and Utah, Nevada, and infrequently as disjunct populations in Arizona and New Mexico. It is the commonest rose of this largely intermontane region that includes the Great Basin in western North America.

2c. Rosa woodsii Lindley subsp. **arizonica** (Rydberg) W. H. Lewis & Ertter, comb. et stat. nov. Basionym: *Rosa arizonica* Rydberg, N. Amer. Fl. 22: 516. 1918. TYPE: U.S.A. Arizona: Coconino Co., vic. of Flagstaff, 2134 m, 15 June 1898, *D. T. Macdougal 110* (holotype, NY 415909; isotypes, F 69856, GH 32554, NY 415910, RM 31869, UC 136507, US 334205). Figure 2J–M.

Rosa adenosepala Wooton & Standley, Contr. U.S. Natl. Herb. 16: 131. 1913. Syn. nov. TYPE: U.S.A. New Mexico: San Miguel Co., along Pecos River, 8 mi. E of Glorietta, 1950 m, 9 June 1897, *A. A. Heller & E. G. Heller 3674* (holotype, US 306499; isotypes, DAO 704029, MIN 130468, MO 1951202, P).

Rosa bakeri Rydberg, Fl. Colorado 191. 1906, nom. illeg., non *Rosa bakeri* A. Déséglise, J. Bot. 2: 267. 1864. Syn. nov. TYPE: U.S.A. Colorado: La Plata Co., Dix Post Office, 1898, *C. F. Baker, F. S. Earle & S. M. Tracy 474* (lectotype, designated here, MO 123806; isotypes, MO 1951244, NY).

Rosa granulifera Rydberg, N. Amer. Fl. 22: 517. 1918. Syn. nov. *Rosa arizonica* var. *granulifera* (Rydberg) Kearney & Peebles, J. Wash. Acad. Sci. 29: 481. 1939. TYPE: U.S.A. Arizona: Navajo Co., W of Holbrook, 10 July 1896, *M. Zuck s.n.* (holotype, NY 415841; isotypes, MO 123818, NY 415840, US 348991).

Rosa neomexicana Cockerell, Entomol. News 12: 38. 1901. Syn. nov. TYPE: U.S.A. New Mexico: Otero Co., Sacramento Mtns., Cloudcroft, grown and collected at Mesilla, New Mexico, 4 May 1894, *T. D. A. Cockerell s.n.* (lectotype, designated here, US 404918; isotype, NY 425856).

Rosa puberulenta Rydberg, Fl. Rocky Mts. 443, 1062. 1917. Syn. nov. TYPE: U.S.A. Utah: San Juan Co., Montezuma Canyon, E of Monticello, 2000 m, 13 Aug. 1911, *P. A. Rydberg & A. O. Garrett 9705* (holotype, NY 415876; isotype, US 765307).

Martin and Hutchins (1980: 930) reduced *Rosa arizonica* to a variety of *R. woodsii*, but as the basionym was not provided, it remains an invalid name. An additional two varieties of theirs, *R. woodsii* var. *adenosepala* (Wooten & Standley) W. C. Martin & C. R. Hutchins (1980: 929) and *R. arizonica* var. *granulifera* (Rydberg) W. C. Martin & C. R. Hutchins (1980: 928), are also invalid, lacking provision of basionym.

Tiehm (1989) provided evidence to support the valid publication of *Rosa bakeri* and also *R. pandorana* Greene (see *R. nutkana* subsp. *melina*) found in Rydberg's *Flora of Colorado* (1906: 191). Rydberg provided no descriptions for these, nor for 26 additional new names, but since he used excellent keys to separate species, Tiehm believed that they were distinguishable and so satisfied the provisions of Article 32.2. However, Rydberg gave no collectors for localities he listed; fortunately, locality descriptions of *Rosa* are sufficiently unique to associate collectors with localities using material at NY, MO, US, and other herbaria. He provided *R. bakeri* with four syntypes. Tiehm suggested that holotypes or lectotypes be selected from collections he listed in his paper, although he clearly stated that he was not designating lectotypes. The latter is fortunate with regard to *R. bakeri*, for Tiehm's choice of *Baker s.n.* (U.S.A. Colorado: Routt Co., Four-miles Hill, 2 July 1896) would have been inappropriate since Rydberg (1904: 561) had already used this collection as holotype of *R. oreophila* (see *R. nutkana* subsp. *melina*). The lectotype selected above (*Baker et al. 474*) is appropriate diagnostic material that clearly delineates between *R. nutkana* and *R. woodsii*, which Rydberg often confused, and since the specific epithet honors Baker as collector, it seems appropriate to select a syntype collected by him. Unfortunately, the *R. oreophila* sheet at NY (415860) is annotated with two holotype labels, one for *R. oreophila*, which the specimen clearly represents (= *R. nutkana* subsp. *melina*), and the other for *R. bakeri*, which it certainly does not. In this instance, the lectotype is chosen from one of two sheets of *Baker et al. 474* at MO (123806), where no ambiguity of identity or typification exists and where Rydberg wrote and initialed "*Rosa bakeri*" on the sheet and later stamped by his writing "OK Dr. Rydberg Sep. 1911."

With regard to lectotypification of *Rosa neomexicana*, Cockerell did not select a type from several collections he and/or E. O. Wooton gathered at Cloudcroft, New Mexico, or from those then cultivated at Mesilla, New Mexico, nor did he indicate a herbarium of deposit, so a lectotype appropriate to his diagnosis was chosen at US with an isolectotype at NY. Martin and Hutchins (1980: 929) reduced *R. neomexicana* to a variety of *R. woodsii*, but as the basionym was not provided, it remains an invalid name.

Rosa woodsii subsp. *arizonica* occurs in Arizona, western Colorado, southwestern Nevada, New Mexico, and Utah at elevations ranging from ca. 1400 to 2200 m, with a possible disjunction in southern Idaho. It is most frequent in Arizona and southern Utah and as such is associated with the southern Colorado Plateau Floristic Element (McLaughlin, 1989) in North America.

Selected exsiccatae. U.S.A. **Arizona:** Apache Co., White Mtns., 10 mi. S of Black River, 1830 m, 22 June 1930, *G. J. Goodman & C. L. Hitchcock 1296* (MO); Cochise Co., Chiricahua Mtns., Stephens' ranch, 1830 m, Oct. 1906, *J. C. Blumer 1240* (US); Coconino Co., Oak Creek Canyon, 9 mi. N of Sedona, 1620 m, 1 July 1992, *J. S. Miller et al. 7746* (MO); rd. to Inner Basin on E side of San Francisco Mtns., 17 Aug. 2004, *B. Ertter et al. 18484* (MO, UC); Mohave Co., Wild Cow Spring, Hualapai Mtns. SE of Kingman, 13 Aug. 2004, *B. Ertter 18489 (with L. Woodruff)* (MO, UC); Yavapai Co., Prescott, 14 Aug. 1932, *G. J. Harrison, T. H. Kearney & R. H. Peebles 8885* (POM, UC). **Nevada:** Clark Co., Charleston Park, Charleston Mtns., 8 Aug. 1937, *I. W. Clokey 7788* (POM, UC); Hidden Forest, Sheep Mtns., 10 June 1940, *A. M. Alexander & L. Kellogg 1701* (UC). **New Mexico:** Grant Co., Mangus Springs, along streams, 30 May 1881, H. H. Rusby 129 1/2 (MO); San Juan Co., San Juan River, Jewett Valley Tract, 1710 m, 18 June 1997, *T. Reeves & L. Reeves 9418* (SJNM). **Utah:** Duchesne Co., 4 mi. N of Mountain Home, 2135 m, 13 June 1934, *B. F. Harrison & E. Larson 7592* (MO); Kane Co., W of Coral Pink Dunes, vic. of Pine Spring, ca. 1700 m, 29 May 1992, *S. L. Welsh 25005* (MO); San Juan Co., Montezuma Canyon, ca. 13 air mi. SSE of Monticello, ca. 1720 m, 19 Aug. 2004, *B. Ertter 18480 (with L. Woodruff)* (MO, UC); Navajo Nation, ca. 2 mi. SE of Blanding, 1720 m, 21 June 2004, *K. Heil et al. 24062* (MO, SJNM); Washington Co., SE of Enterprise Reservoir, 1780 m, 18 June 1998, *L. Higgins 19725* (MO).

2d. Rosa woodsii Lindley subsp. **manca** (Greene) W. H. Lewis & Ertter, comb. et stat. nov. Basionym: *Rosa manca* Greene, Pittonia 4: 11. 1899. TYPE: U.S.A. Colorado: Montezuma Co., Upper West Mancos Cañon, 2750 m, 3 July 1898, *C. F. Baker, F. S. Earle & S. M. Tracy 313* (holotype, NDG 23545; isotypes, F 76117 & 356377, GH 32587, K, MO 123823, NO, NY 415852 & 415853, RM 13646 & 156323, US 337232). Figure 2E–F.

Rosa woodsii subsp. *manca* occurs in the high mountains of Arizona, Colorado, New Mexico, Utah, and Wyoming (rare) at elevations ca. 2350–3300+ m within the Southern Rocky Mountain–Mogollon Floristic Element (McLaughlin, 1986, 1989) in North America. It is not the *R. manca* sensu Erlanson (1934: 230), which is described as a hexaploid ecotype species of *R. nutkana* (= subsp. *melina*).

Selected exsiccatae. U.S.A. **Arizona:** Apache Co., Luka-Chukai Mtns. 2800 m, 4 July 1936, *G. J. Goodman & L. B. Payson 2926* (MO); Coconino Co., Kendrick Peak along trail 22, 3050 m, 5 Aug. 1983, *J. Ricketson 570* (MO). **Colorado:** Archuleta Co., along Piedra River trail, 2990 m, 30 June 1999, *K. Heil et al. 13435* (SJNM); Gunnison Co., Gothic, N of Judd Falls along Copper Creek, 2990–3050 m, 26 July 1977, *L. J. Dorr 602* (MO); Mineral Co., 0.3 mi. from jct. of hwy. 160 & Tucker Ponds rd., 2830 m, 21 July 2005, *W. H. Lewis & M. Elvin-Lewis 21005* (MO, UC); Montrose Co., Uncompahgre Plateau, 19 air mi. SW of Montrose, 2965 m, 7 Aug. 2004, *B. Ertter et al. 18463* (MO, UC); Ouray Co., SE of Ouray, 2300–2600 m, 7 Sep. 1901, *L. M. Underwood & A. D. Selby 63* (NY); Summit Co., Lake Dillon, near jct. of hwys. 170 & 6, 2800 m, 9 July 1985, *W. H. Lewis 9828* (MO), *9829* (MO). **New Mexico:** McKinley Co., Navajo Nation, ca. 12.5 mi. turning SE of Whiskey Lake rd., 2685 m, 15 Sep. 2004, *K. Heil & W. Mietty 24937* (MO, SJNM); San Miguel Co., Sangre de Cristo Mtns., valley of Gallinas River, 2590–2745 m, 11–17 Aug. 1945, *C. L. Lundell & A. A. Lundell 14478* (MO); Taos Co., Carson Natl. Forest, ca. 8 mi. NW of Mora, 2750 m, 1 July 1998, *H. H. Schmidt et al. 2727* (MO); Forestry rd. 537 from Red River to Cabresto Canyon, 2440–2775 m, 17 June 2006, *H. van der Werff 21523* (MO). **Utah:** San Juan Co., N slope of Abajo Mtns., 2590–3355 m, 1–2 July 1930, *G. J. Goodman & C. L. Hitchcock 1424* (F); Navajo Nation, Navajo Mtn., just E of War God Spring, 2608 m, 7 July 2001, *S. L. O'Kane Jr. et al. 5797* (SJNM); Uinta Co., Uinta Basin, Taylor Mtn., Davis Hollow, 2655 m, 7 Sep. 1931, *E. H. Graham 7492* (MO); Washington Co., Markagunt Plateau, ca. 1.6 km N of Kolob Reservoir, 2500 m, 7 July 1984, *N. H. Holmgren & P. K. Holmgren 10591* (NY, UT). **Wyoming:** Sweetwater Co., S side of Cedar Mtns., 2440 m, 7 July 1981, *R. W. Lichvar 4574* (NY).

2e. Rosa woodsii Lindley subsp. **gratissima** (Greene) W. H. Lewis & Ertter, stat. nov. Basionym: *Rosa gratissima* Greene, Fl. Francisc. 1: 73. 1891. *Rosa pisocarpa* var. *gratissima* (Greene) Jepson, Man. Fl. Pl. Calif. 499. 1925. *Rosa woodsii* var. *gratissima* (Greene) D. Cole, Amer. Midl. Naturalist 55: 223. 1956. Syn. nov. TYPE: U.S.A. California: Kern Co., near Tehachapi, mtns. by wet meadows, 24 June 1889, *E. L. Greene s.n.* (holotype, NDG 23620; isotype, NY 415842).

Rosa woodsii subsp. *gratissima* occurs in springs and along streams in the mountains in and surrounding the Mojave Desert and southern Great Basin, from the east side of the Sierra Nevada in Mono County, California, east to Eureka County in central Nevada, and south to the Nevada Test Site in Nye County and the north slope of the San Bernardino Mountains, San Gabriel Mountains, and Mount Pinos in southern California. This is also the characteristic subspecies in the southern Sierra Nevada from Fresno County southward, and populations occur in the White Mountains on the California–Nevada border and the Panamint Mountains west of Death Valley.

Selected exsiccatae. U.S.A. **California:** Fresno Co., Doris Lake, 1 mi. N of High Sierra Pack Station at Mono Hot Springs on S Fork San Joaquin River N of Kaiser Ridge, 27 Aug. 1959, *C. H. Quibell 3389* (RSA, UC); Inyo Co., Thorndykes Springs, Wildrose Canyon, Panamint Mtns., 12 July 1947, *J. C. Roos 2837* (RSA); Big Pine Creek at foot of trail to Big Pine Lakes, 26 July 1934, *R. S. Ferris 9009* (DS, UC); Kern Co., 3 mi. E of monolith, [s.d.], *M. Zigmond 713* (POM); Los Angeles Co., Prairie Fork of San Gabriel River,

23 Aug. 1917, *I. M. Johnston 1704* (RSA, UC); Mono Co., 2 mi. SE of Hardy Station, 11 Sep. 1936, *W. A. Peterson 593* (UC); San Bernardino Co., 2 mi. along Mill Creek Rd. and 2N10 from Coldbrook Campgound, San Bernardino Mtns., 15 July 1976, *R. F. Thorne, L. DeBuhr, C. Davidson & C. W. Tilforth 47723* (RSA, UC); Tulare Co., S branch of Monache Creek, near S fork of Kern River, 24 July 1950, *P. A. Munz 15349* (RSA); Ventura Co., Seymour Meadows, Mt. Pinos, 11 July 1905, *H. M. Hall 6624* (UC). **Nevada:** Clark Co., Indian Springs, base of NE slope of Spring Mtns., 1860 m, 1 June 1970, *J. Beatley & J. L. Reveal 10822* (MO); Esmeralda Co., 1 mi. E of Lida, 9 Aug. 1928, *C. B. Wolf 3218* (RSA); Trail Canyon, White Mtns., 1 July 1931, *V. Duran 3089* (POM, UC); Eureka Co., vic. of the Willows, ca. 34 mi. W of Eureka, 5 July 1937, *F. S. Goodner & W. H. Henning 572* (POM); Lincoln Co., Bald Mtn. Spring, Timpahute Range, 2000 m, 2 July 1968, *J. L. Reveal & J. C. Beatley 1451* (MO); Lander Co., Smith's Creek Canyon, 44 mi. W of Austin, 10 July 1937, *F. S. Goodner & W. H. Henning 655* (MO); Nye Co., along wash below Cliff Spring, Belted Range, Nevada Test Site, 8 June 1969, *J. Beatley & H. Kaaz 8890* (RSA); Thirsty Canyon, Rose Creek, 1830 m, 27 July 1967, *J. Beatley & W. H. Rhoads 4547* (MO).

2e1. Rosa woodsii Lindley var. **glabrata** (Parish) D. Cole, Amer. Midl. Naturalist 55: 223. 1956, non *Rosa glabrata* P. Kitaibel in A. Kanitz, Linnaea 32: 588. 1863. *Rosa californica* Chamisso & Schlechtendal var. *glabrata* Parish, Erythea 6: 88. 1898. *Rosa mohavensis* Parish, Bull. Soc. S. Calif. 1: 87. 1902. *Rosa woodsii* var. *mohavensis* (Parish) Jepson, Fl. Calif. 2: 210. 1936, nom. illeg., earlier name available at rank. TYPE: U.S.A. California: San Bernardino Co., desert side of San Bernardino Mtns., Cushenberry Spring, 1200 m, 1 June 1892, *S. B. Parish 2481* (holotype, DS; isotype, GH).

Localized clusters of glabrous populations on the north foot of the San Bernardino Mountains represent the variety *glabrata* within *Rosa woodsii* subsp. *gratissima*.

Selected exsiccatae. U.S.A. **California:** San Bernardino Co., Box "S" Springs, Mojave Desert, 28 Apr. 1926, *H. L. Mason 3090* (GH, UC); 2 mi. W of Cushenberry Springs, 975 m, 9 Oct. 1937, *P. A. Munz & F. Youngberg 14962* (MO).

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